
thesis_flex_tree

February 23, 2014

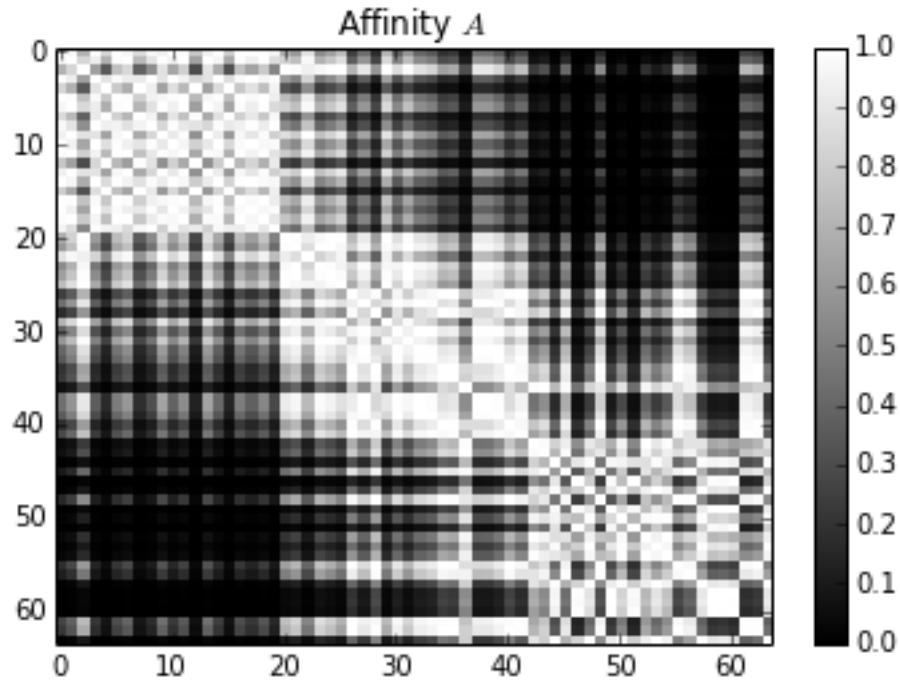
```
In [1]: from imports import *
import bin_tree_build
np.random.seed(20090403)
```

Again we consider a toy affinity for demonstration purposes. We take

$$A(i, j) \sim \exp\left(-\frac{|x_i - x_j|^2}{100}\right),$$

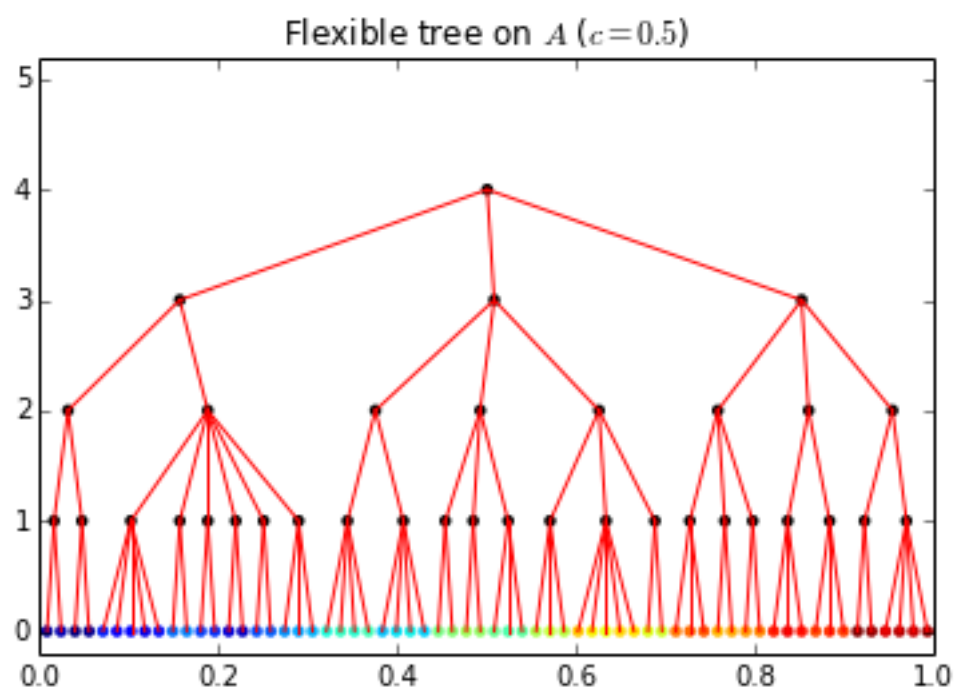
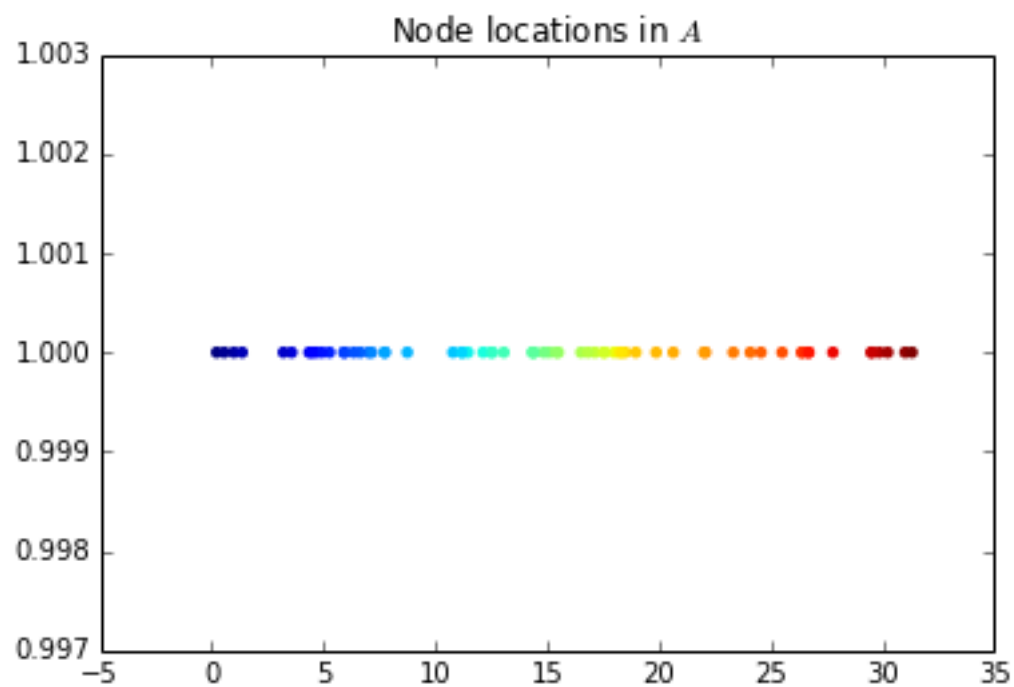
where points are drawn from a Gaussian with mean 5 for nodes 0-20, 15
for nodes 21-41, and 25 for nodes 42-63, and standard deviation 3.

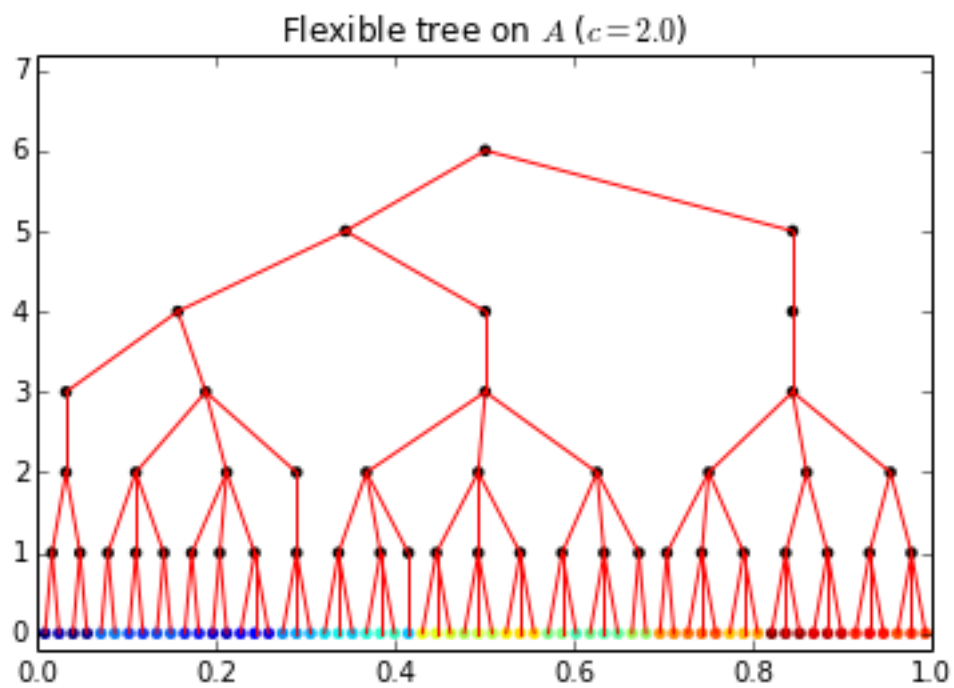
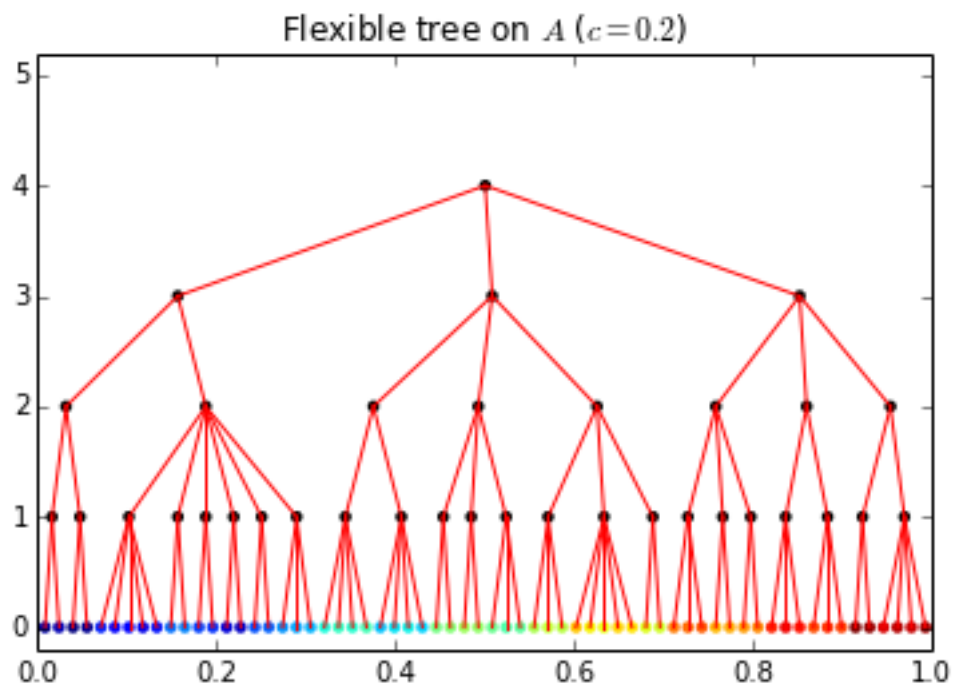
```
In [2]: A = np.zeros([64,64])
means = [5.0,15.0,25.0]
sigma = 3.0
locs = np.zeros(64)
locs[0:21] = np.random.normal(means[0],sigma,21)
locs[21:42] = np.random.normal(means[1],sigma,21)
locs[42:] = np.random.normal(means[2],sigma,22)
for i in xrange(64):
    for j in xrange(64):
        d_ij = locs[i]-locs[j]
        A[i,j] = np.exp(-(d_ij**2.0)/100.0)
bwplot(A)
plt.colorbar()
plt.title("Affinity $A$")
plt.show()
```



We next construct some flexible trees on A .

```
In [5]: leafcolors = np.arange(-1.0,1.0,2.0/64.0)[locs.argsort().argsort()]
plt.scatter(locs,np.ones(len(locs),np.int),c=leafcolors,edgecolors='none')
plt.title("Node locations in  $A$ ")
plt.show()
ft1 = tree_building.flex_tree(A,0.5,1e-3)
plot_utils.plot_tree(ft1,leafcolors=leafcolors)
plt.title("Flexible tree on  $A$  ( $c=0.5$ )")
plt.show()
ft1 = tree_building.flex_tree(A,0.2,1e-3)
plot_utils.plot_tree(ft1,leafcolors=leafcolors)
plt.title("Flexible tree on  $A$  ( $c=0.2$ )")
plt.show()
ft1 = tree_building.flex_tree(A,2.0,1e-3)
plot_utils.plot_tree(ft1,leafcolors=leafcolors)
plt.title("Flexible tree on  $A$  ( $c=2.0$ )")
plt.show()
```





In [3]: